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Canadian Science Advisory Secretariat
Newfoundland and Labrador Region | Science Response 2016/020

ATLANTIC SALMON *(Salmo salar)* STOCK STATUS UPDATE IN NEWFOUNDLAND AND LABRADOR FOR 2015

Context

The stock assessment of Atlantic Salmon (*Salmo salar*) in the Newfoundland and Labrador (NL) Region is conducted every five years, with the most recent assessment completed after the 2013 return year (DFO 2015a). An annual update of stock status is prepared in interim years to provide data and information to DFO Fisheries Management and the general public (DFO 2015b). Indicators of adult and juvenile (smolt) Atlantic Salmon stocks are derived from data collected at monitoring facilities and fisheries catch statistics, which are summarized in this report. Three of the four (75%) monitored rivers in Labrador and eight of the 12 (67%) rivers in Newfoundland achieved conservation egg requirements (limit reference point) in 2015. This Science Response Report results from the Regional Science Response Process of March 8, 2016 on the Newfoundland and Labrador Atlantic Salmon (*Salmo salar*) 2015 Stock Status Update.

Background

In 2015, NL Atlantic Salmon populations were monitored on 17 rivers (Figure 1). For management purposes, Atlantic Salmon are categorized as small (< 63 cm fork length) and large salmon (≥ 63 cm fork length). The status of Atlantic Salmon river populations is assessed by comparing estimated egg deposition (calculated from salmon counts at monitoring facilities, recreational angling data and biological characteristics of sampled fish) to the river-specific conservation egg requirement that is considered a limit reference point in the context of Fisheries and Oceans Canada's Precautionary Approach Framework (O'Connell et al.1997, Reddin et al. 2006, DFO 2009, Chaput et al. 2012, Chaput 2015). Comparisons are made with reference to time periods during the Atlantic Salmon commercial fishery (pre-moratorium years, prior to 1992 for Newfoundland and 1997/98 for Labrador), commercial fishery moratorium years, and the previous generation of Atlantic Salmon (a mean of five years for Newfoundland and six years for Labrador).

Canada

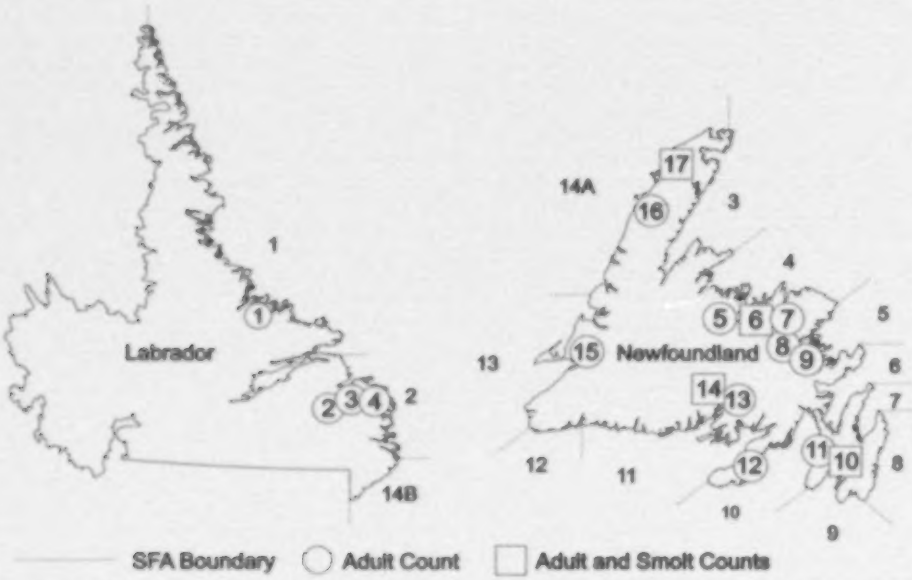

Figure 1. Map showing the locations of rivers in Salmon Fishing Areas (SFAs) 1–14B where Atlantic Salmon populations were monitored in 2015: (1) English River, (2) Southwest Brook, Paradise River, (3) Muddy Bay Brook, (4) Sand Hill River, (5) Exploits River, (6) Campbellton River, (7) Salmon Brook, Gander River, (8) Middle Brook, (9) Terra Nova River, (10) Rocky River, (11) Northeast River Placentia, (12) Garnish River, (13) Little River, (14) Conne River, (15) Harry's River, (16) Torrent River, and (17) Western Arm Brook.

Analysis and Response

Abundance of Adult Atlantic Salmon

Adult Atlantic Salmon returning to rivers in Newfoundland and Labrador are predominantly small salmon (< 63 cm fork length: range 74–96% from 2010–14) that are mainly virgin one-sea winter fish (1SW, grilse) (2010–14; Table 1). Large salmon in Newfoundland are mainly repeat spawners with the exception of SFA 13 (southwest coast) which has a larger multi-sea winter component (MSW). Large salmon in Labrador are mainly MSW salmon (Table 1).

Table 1. Characteristics of small and large Atlantic Salmon sampled in NL 2010–14.

Area	Sample Size	Small Salmon - % Virgin 1SW	Small Salmon - % Virgin MSW	Small Salmon - % Repeat 1SW	Small Salmon - % Repeat MSW	Sample Size	Large Salmon - % Virgin 1SW	Large Salmon - % Virgin MSW	Large Salmon - % Repeat 1SW	Large Salmon - % Repeat MSW
Labrador	1190	99.4	0.1	0.5	-	223	6.7	72.2	14.8	6.3
Newfoundland (excluding SFA 13)	3549	80.7	0.1	19.2	-	332	5.1	7.5	86.8	0.6
SFA 13	215	78.6	-	20.5	0.9	127	-	18.1	58.3	23.6

Returns of adult salmon to monitored rivers in Newfoundland and Labrador are shown in Figures 2 to 7. Salmon abundance monitoring resumed at Salmon Brook (SFA 4) and Northeast River, Placentia (SFA 10) in 2015, while a new project was initiated at Garnish River (SFA 11).

In 2015, returns of small salmon were generally similar to, or greater than, the long-term moratorium means for three of four rivers in Labrador (exception Sand Hill River), the five northeast coast rivers (SFAs 3–8), Conne River (SFA 11), and the three west coast rivers (SFAs 13-14A). At Northeast River, Placentia (SFA 10), last monitored in 2002, returns of small salmon were 21% below the 1992-2002 mean, while at Garnish River, returns of small salmon in 2015 were well above the reported angling catch during the past decade (2005–14 mean catch of 174 salmon). Small salmon returns at Muddy Bay Brook (SFA 2) were the highest on record, while English River (SFA 1) had the second highest returns. The fishway at Rocky River was under reconstruction and not operational in 2015. During this time, fish were captured and transferred above the fishway; however, these efforts were impacted by unfavourable environmental conditions (e.g. low water levels and high water temperatures) resulting in an inability to capture and transfer all returning fish to the river. Returns of large salmon were greater than the long-term moratorium means on all four monitored rivers in Labrador and either the highest or second highest on record. Large salmon were also similar to, or greater than, the long-term moratorium mean on the northeast coast rivers (SFAs 3–8), Conne River (SFA 11) and Harry's River (SFA 13), but were well below this level on Little River (SFA 11) and Western Arm Brook (SFA 14A). At Northeast River, Placentia, returns of large salmon were 9% below the 1992-2002 mean.

Conservation Egg Requirements Reference Point

Preliminary summaries of the 2015 status of salmon populations in Labrador are provided in Table 2 and for Newfoundland in Table 3. Three of the four (75%) monitored rivers in Labrador achieved conservation in 2015 and the fourth, Sand Hill River (SFA 2), achieved 95% conservation. English River (SFA 1) achieved conservation for the fifth year in a row, and was above the previous six-year mean. In Newfoundland, eight of the 12 monitored rivers (67%) achieved conservation (excludes Rocky River as the fishway was not operational in 2015). Two of the four rivers that did not achieve conservation are located on the south coast of Newfoundland (Little River and Garnish River), while the other two rivers located on the northeast coast (Exploits River and Terra Nova River) have undergone enhancement and have yet to achieve conservation.

Table 2. Preliminary summary of the 2015 status of Atlantic Salmon populations in Labrador (SFAs 1, 2 and 14B).

River	SFA	2015 Small Salmon Return	2015 Large Salmon Return	2009-14 Mean Small Salmon Return	2009-14 Mean Large Salmon Return	2015 Conservation Egg Requirement Achieved (%)	2009-14 Mean Conservation Egg Requirement Achieved (%)	Number of Years Conservation Egg Requirement Achieved 2009-15
English River	1	734	258	457	124	298	162	6
Sand Hill River	2	2,625	1,104	3,246	768	95	93	1
Muddy Bay Brook*	2	556	45	228	22	216	92	3
Southwest Brook	2	305	58	184	33	117	69	2

**Muddy Bay Brook was not operational in 2010 and 2012.*

Table 3. Preliminary summary of the 2015 status of Atlantic Salmon populations in Newfoundland (SFAs 3-14A).

River	SFA	2015 Small Salmon Return	2015 Large Salmon Return	2010-14 Mean Small Salmon Return	2010-14 Mean Large Salmon Return	2015 Conservation Egg Requirement Achieved (%)	2010-14 Mean Conservation Egg Requirement Achieved (%)	Number of Years Conservation Egg Requirement Achieved 2010-15
Exploits River	4	27,996	3,387	30,933	5,636	50	60	0
Campbellton River	4	4,016	479	4,116	518	394	411	6
Salmon Brook*	4	1,297	314	1,563	103	202	180	5
Middle Brook	5	3,550	424	2,785	321	427	316	6
Terra Nova	5	4,586	684	4,031	470	82	68	0
Rocky River[1]	9	128 Transferred	19 Transferred	544	34	15	58	0
Northeast River, Placentia*	10	629	114	-	-	391	-	1
Garnish River*	11	658	39	-	-	61	-	0
Little River	11	99	0	170	4	42	75	2
Conne River	11	2,276	127	1,843	77	110	72	2
Harry's River	13	4,236	678	2,862	458	147	99	4
Torrent River	14A	5,458	640	3,408	1,134	947	831	6
Western Arm Brook	14A	1,612	22	1,287	65	525	478	6

**Salmon Brook fishway was not operational in 2014. 2015 was the first year that Northeast River, Placentia was in operation since 2002. Garnish River was a new project in 2015.*

[1]Rocky River fishway was not operational in 2015. Salmon were captured and transferred into the river above the fishway and likely does not reflect the number of fish that could have returned to the river.

Smolt Abundance and Marine Survival

Smolt abundance (freshwater production) in 2015 declined across all monitored rivers relative to the previous five-year mean (Figure 8), with declines ranging from approximately 20 to 40%. Smolt production at Conne River was the lowest on record, and was either the lowest (Campbellton River) or second lowest recorded during the past 10 years at the other locations (Western Arm Brook, Rocky River). Marine survival of smolts (2014) to returning adult small salmon (2015) was greater than the previous five-year mean at Conne River and Western Arm Brook, but below the mean at Campbellton River, where it was the lowest since 2007 (Figure 9). Marine survival rates could not be calculated for Rocky River as the fishway was undergoing reconstruction and not operational in 2015. Overall, marine survival continues to remain relatively low despite the closure of marine commercial fisheries in Newfoundland (1992) and Labrador (1997/98).

Newfoundland and Labrador Salmon Harvest

The 2015 preliminary estimate of total harvest in the recreational fishery was 26,973 salmon. The number of hooked and released fish was estimated at 30,258 for a total catch of 57,231 salmon. Recreational harvest has increased annually since 2012 and was above the previous five-year mean in 2015 (Figure 10).

Labrador subsistence fisheries harvest was estimated at 15,069 salmon (8,923 small and 6,146 large) (42 t) in 2015, which is the largest harvest by weight since 2000 (Figure 11). There has been a general increasing trend in subsistence fishery harvests since 2000 from 16 t to 42 t, averaging 38 t per year from 2000–15.

Conclusions

Three of the four (75%) monitored rivers in Labrador and eight of the 12 (67%) monitored rivers in Newfoundland (excludes Rocky River) achieved conservation in 2015. Salmon returns to Newfoundland and Labrador rivers have increased since the closure of the commercial salmon fisheries, with the exception of some rivers on Newfoundland's south coast. In general, annual returns of Atlantic Salmon are highly variable and populations on the south coast continue to decline. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated South Newfoundland (SFAs 9-12) Atlantic Salmon populations as *threatened* in 2010 (COSEWIC 2010). Marine survival is considered to be a major factor limiting the abundance of Atlantic Salmon within the region.

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March 17, 2016

Sources of information

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Appendix

Labrador (SFAs 1, 2, and 14B)

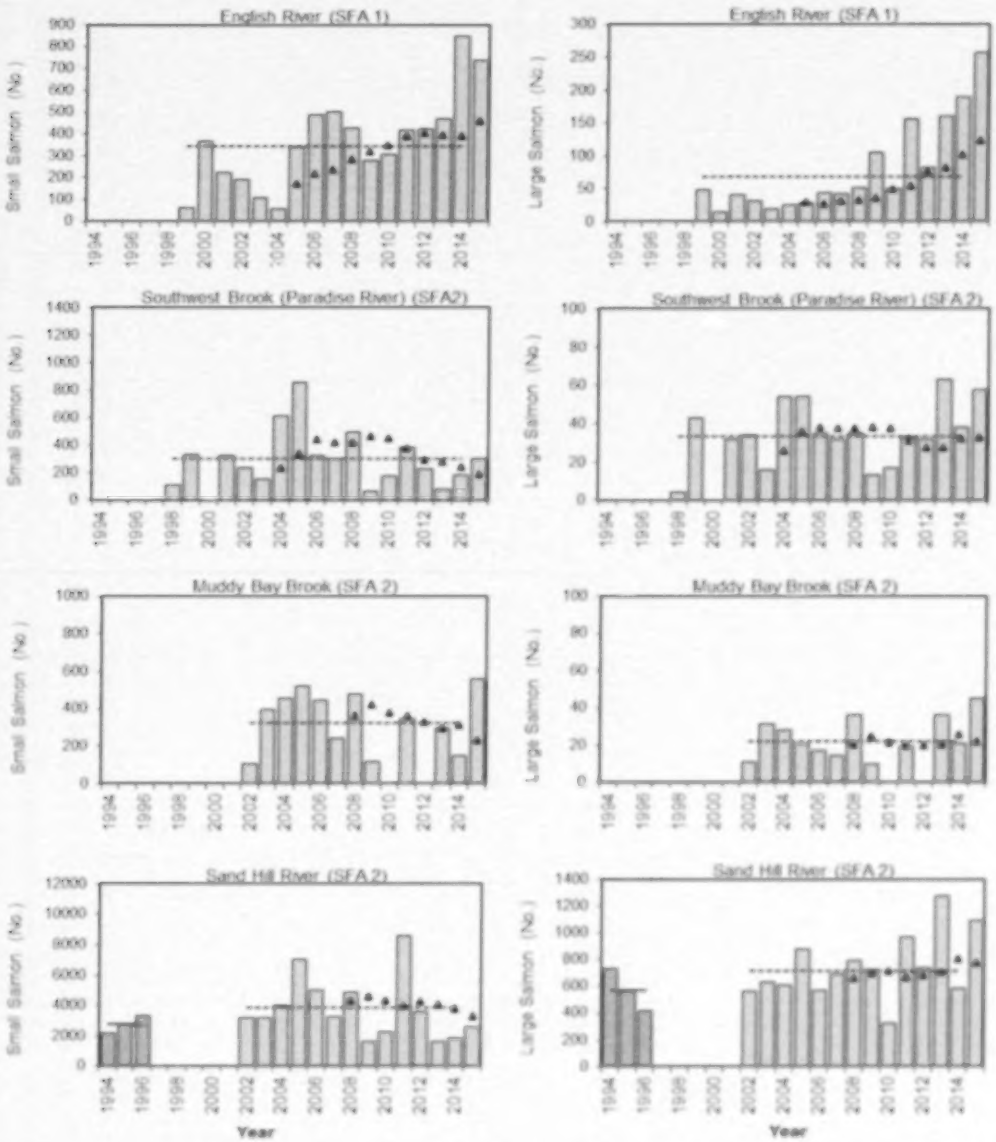

Figure 2. Total returns of small (left panel) and large (right panel) Atlantic Salmon from 1994–2015 to English River (SFA 1) and three SFA 2 rivers; Southwest Brook (Paradise River), Muddy Bay Brook and Sand Hill River. Where available, data is presented for pre-moratorium years (dark grey bars, solid line mean) and moratorium years (light grey bars, dashed line mean). Triangles represent previous six-year means.

Northeast Coast (SFAs 3–8)

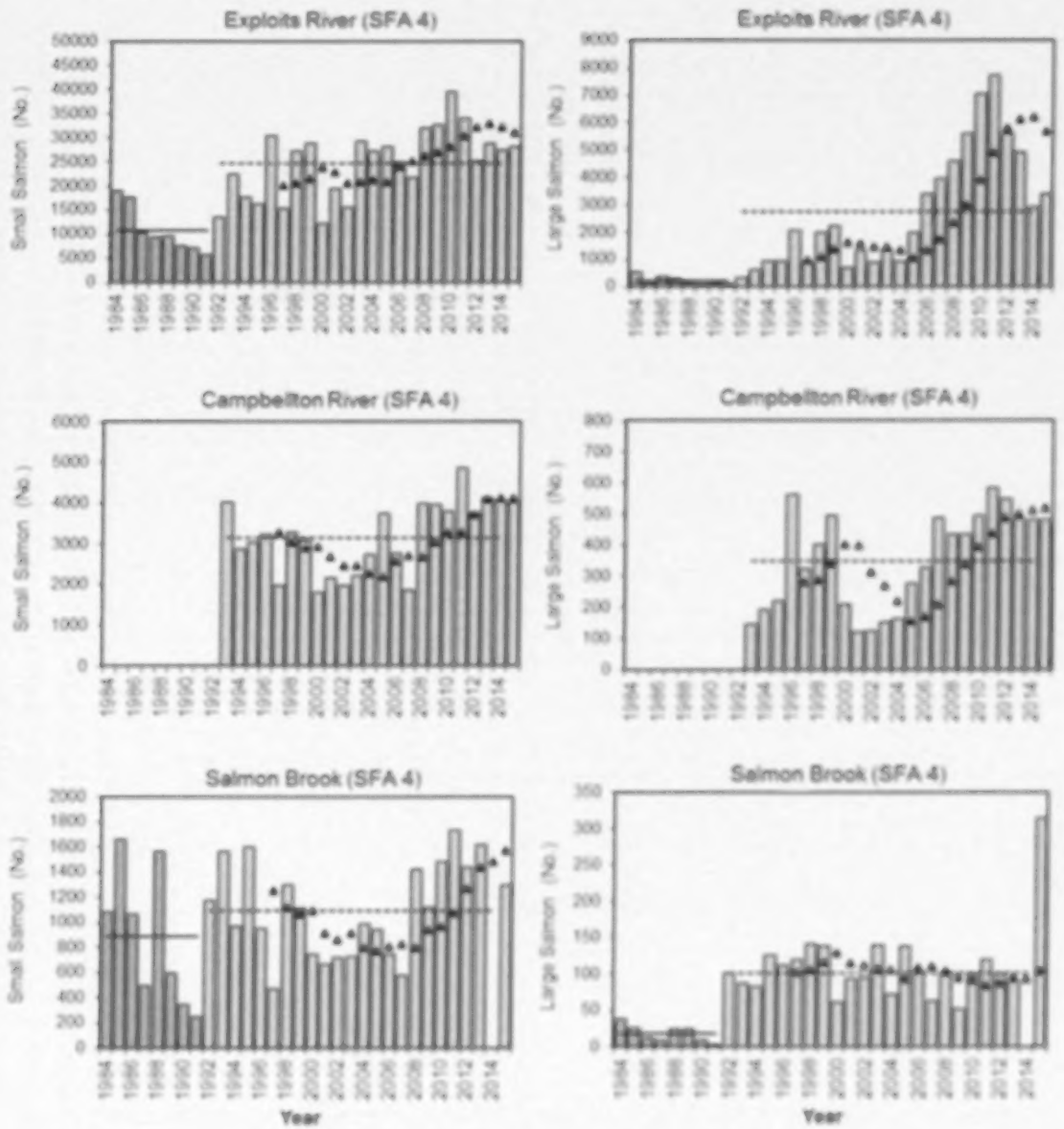

Figure 3. Total returns of small (left panel) and large (right panel) Atlantic Salmon from 1984-2015 to three SFA 4 rivers; Exploits River, Campbellton River and Salmon Brook (Gander River). Where available, data is presented for pre-moratorium years 1984-1991 (dark grey bars, solid line mean) and moratorium years 1992–2014 (light grey bars, dashed line mean). Triangles represent previous five-year means.

Northeast Coast (SFAs 3–8)

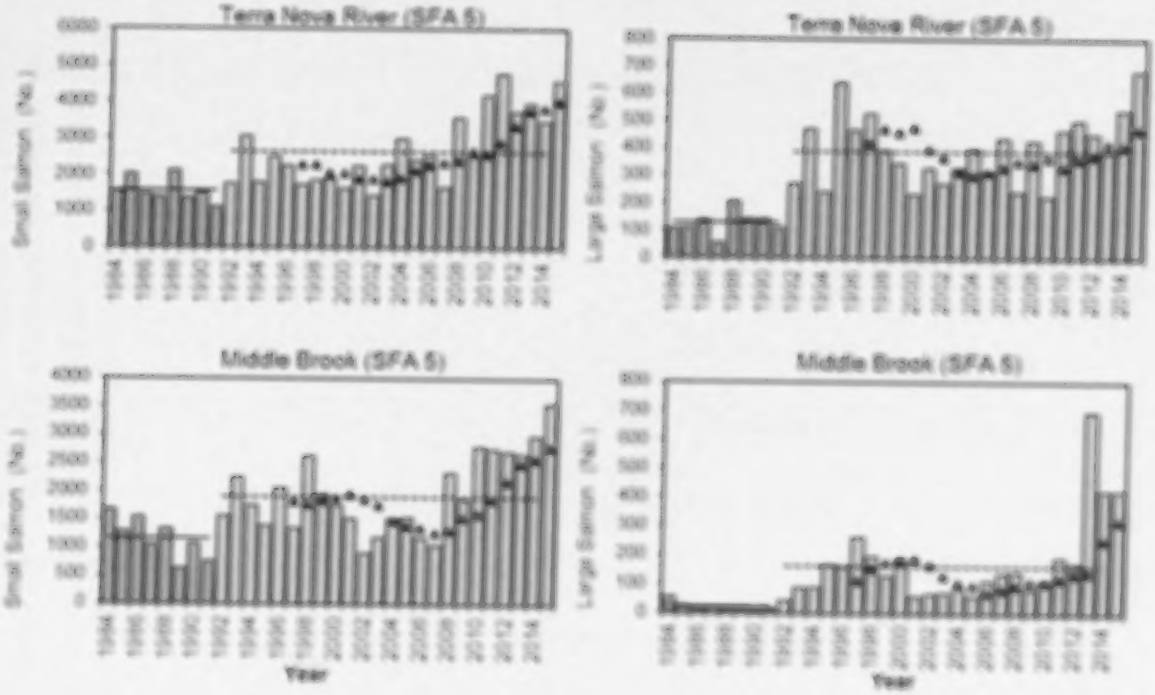

Figure 4. Total returns of small (left panel) and large (right panel) Atlantic Salmon from 1984–2015 to Terra Nova River and Middle Brook (SFA 5). Where available, data is presented for pre-moratorium years 1984–1991 (dark grey bars, solid line mean) and moratorium years 1992–2014 (light grey bars, dashed line mean). Triangles represent previous five-year means.

South Coast (SFAs 9–12)

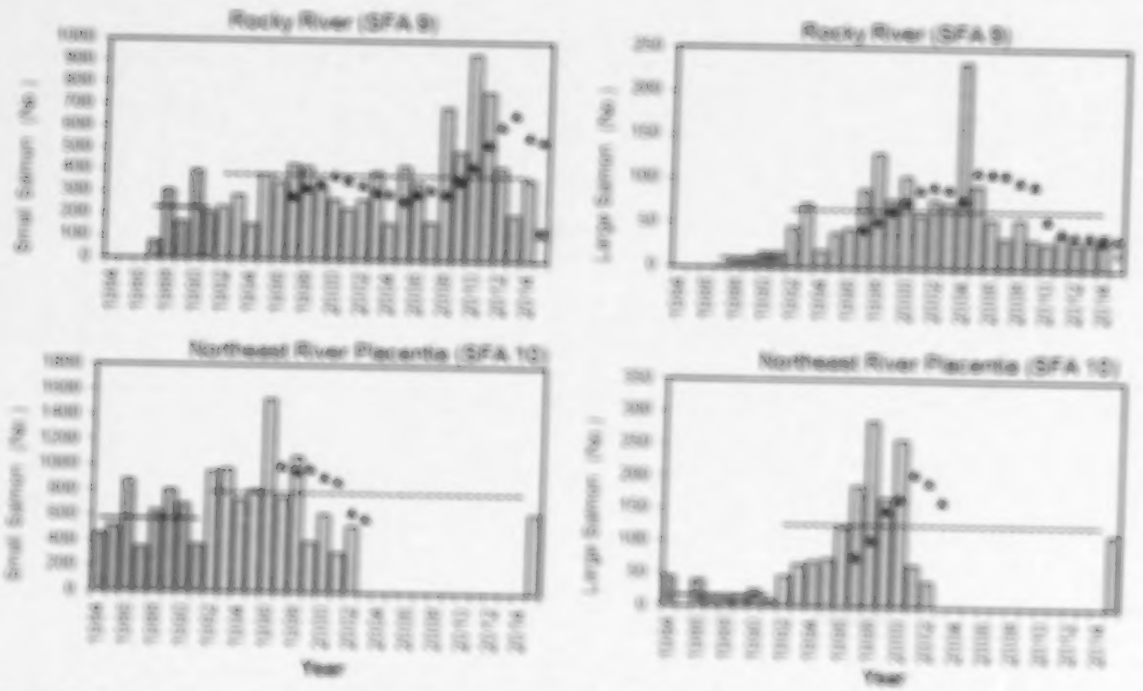

Figure 5. Total returns of small (left panel) and large (right panel) Atlantic Salmon from 1984–2015 to Rocky River (SFA 9) and Northeast River, Placentia (SFA 10). Where available, data is presented for pre-moratorium years 1984–1991 (dark grey bars, solid line mean) and moratorium years 1992–2014 (light grey bars, dashed line mean). Triangles represent previous five-year means. The number of small and large salmon transferred into Rocky River in 2015 is presented by an asterisk.

South Coast (SFAs 9–12)

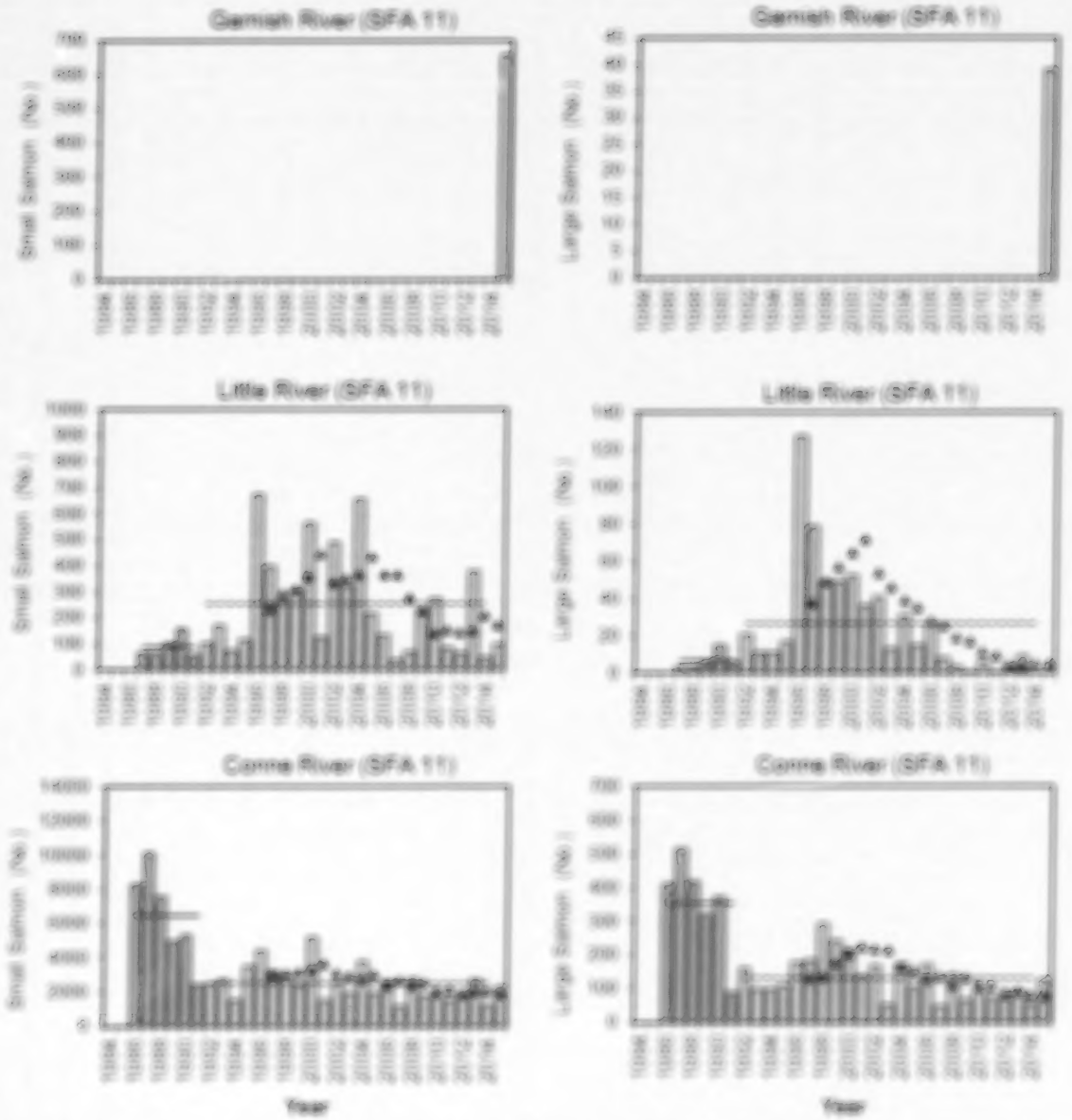

Figure 6. Total returns of small (left panel) and large (right panel) Atlantic Salmon from 1984–2015 to three SFA 11 rivers, Garnish River, Little River and Conne River. Where available, data is presented for pre-moratorium years 1984–1991 (dark grey bars, solid line mean) and moratorium years 1992–2014 (light grey bars, dashed line mean). Triangles represent previous five year means.

West Coast (SFAs 13–14A)

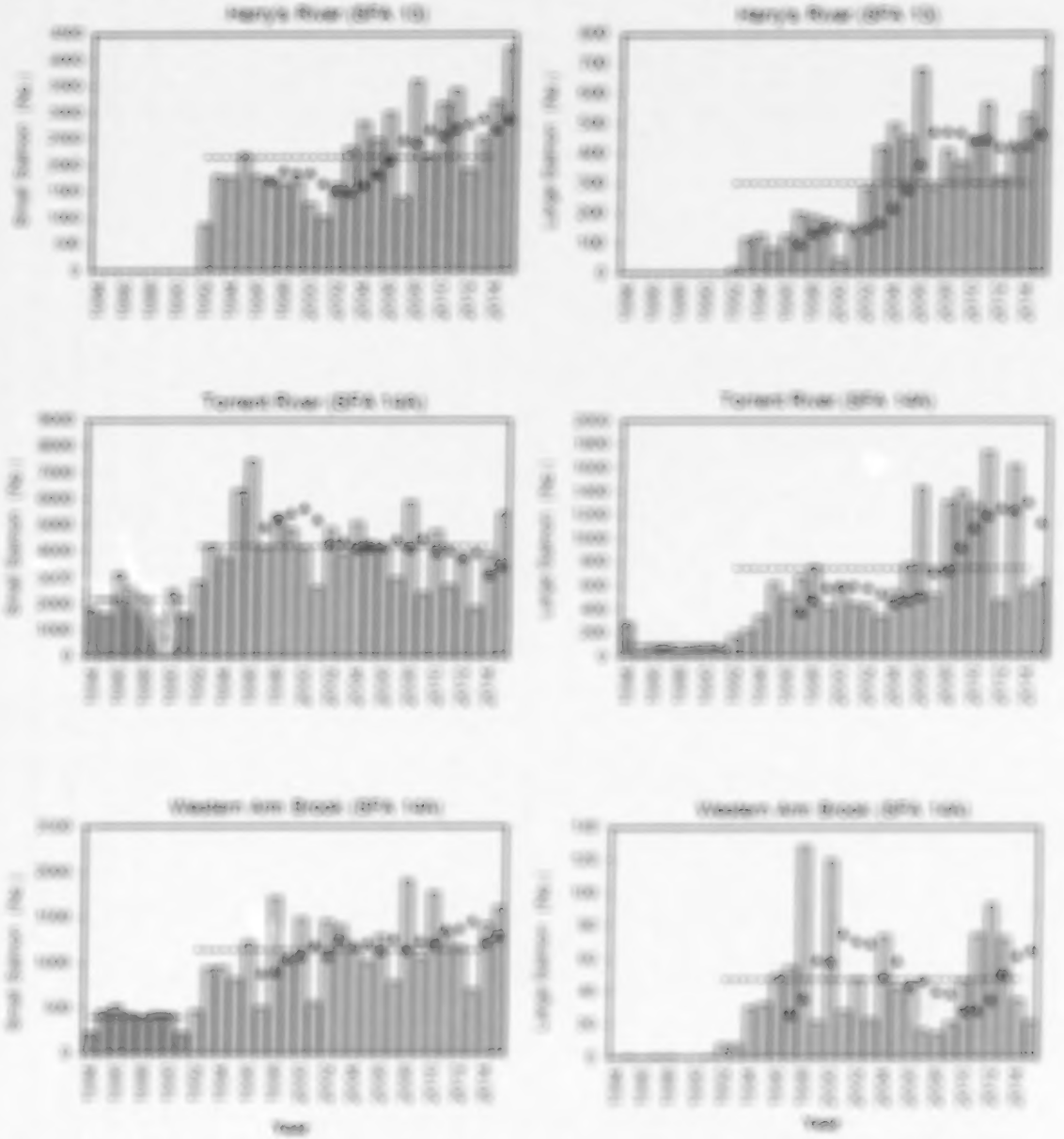

Figure 7. Total returns of small (left panel) and large (right panel) Atlantic Salmon from 1950s–2018 to Harry's River (SFA 13), and two rivers in SFA 14A, Torrent River and Western Arm Brook. Where available, data is presented for pre-moratorium years 1950s–1992[1] (dark grey bars, solid line mean) and moratorium years 1992–2018 (light grey bars, dashed line mean). Triangles represent previous five year means.

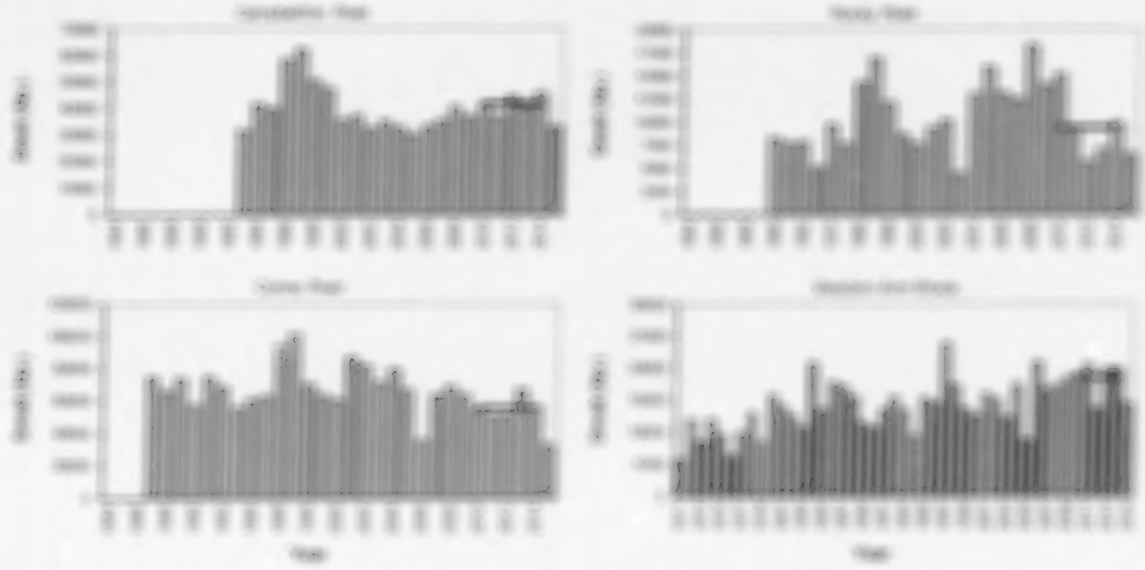

Figure 8. Atlantic Salmon smolt production (num) of five rivers in Newfoundland. Horizontal black line represents previous five-year mean.

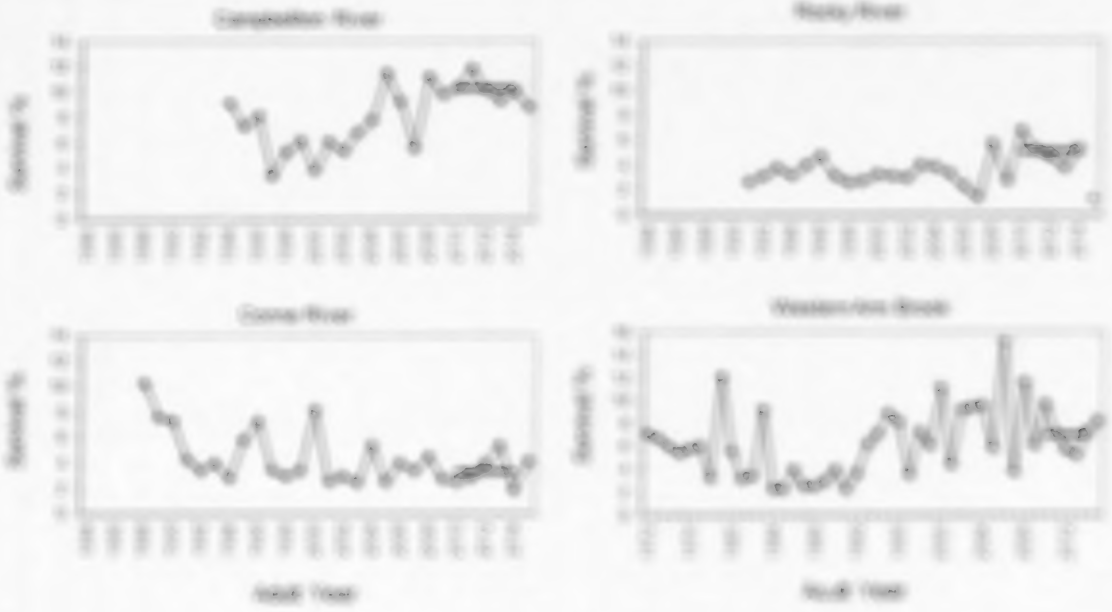

Figure 9. Marine survival of Atlantic Salmon smolt (num) to small adult salmon from five rivers in Newfoundland. Horizontal black line represents previous five-year mean. Rocky River fishway was not operational in 2018.

Recreational Salmon Catch – Newfoundland and Labrador (1994-2015)

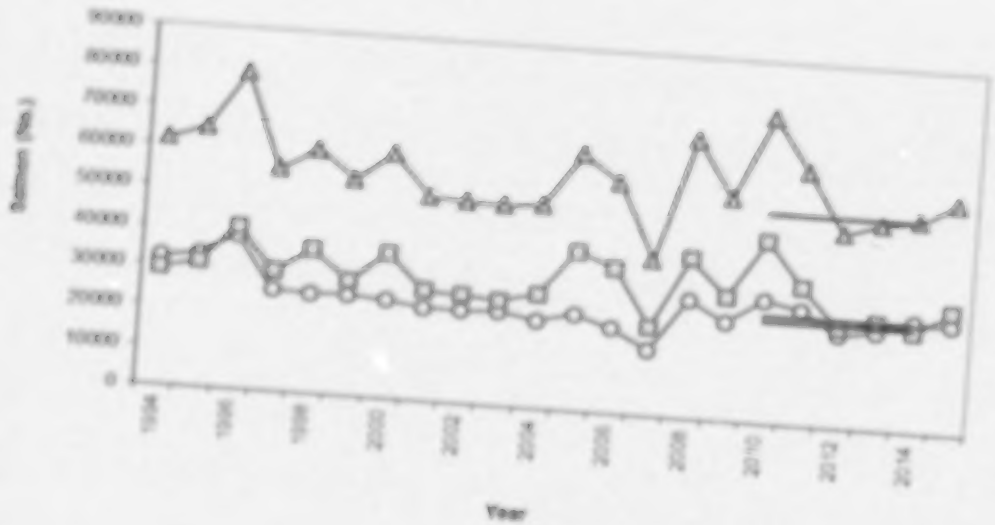

Figure 10. Recreational catch of Atlantic Salmon in Newfoundland and Labrador (1994–2015 preliminary) for retained fish (open circles), released fish (grey square) and total catch (retained + released) (grey triangle). Horizontal black line represents previous five-year means.

Labrador Subsistence Fisheries Harvest (1999–2015)

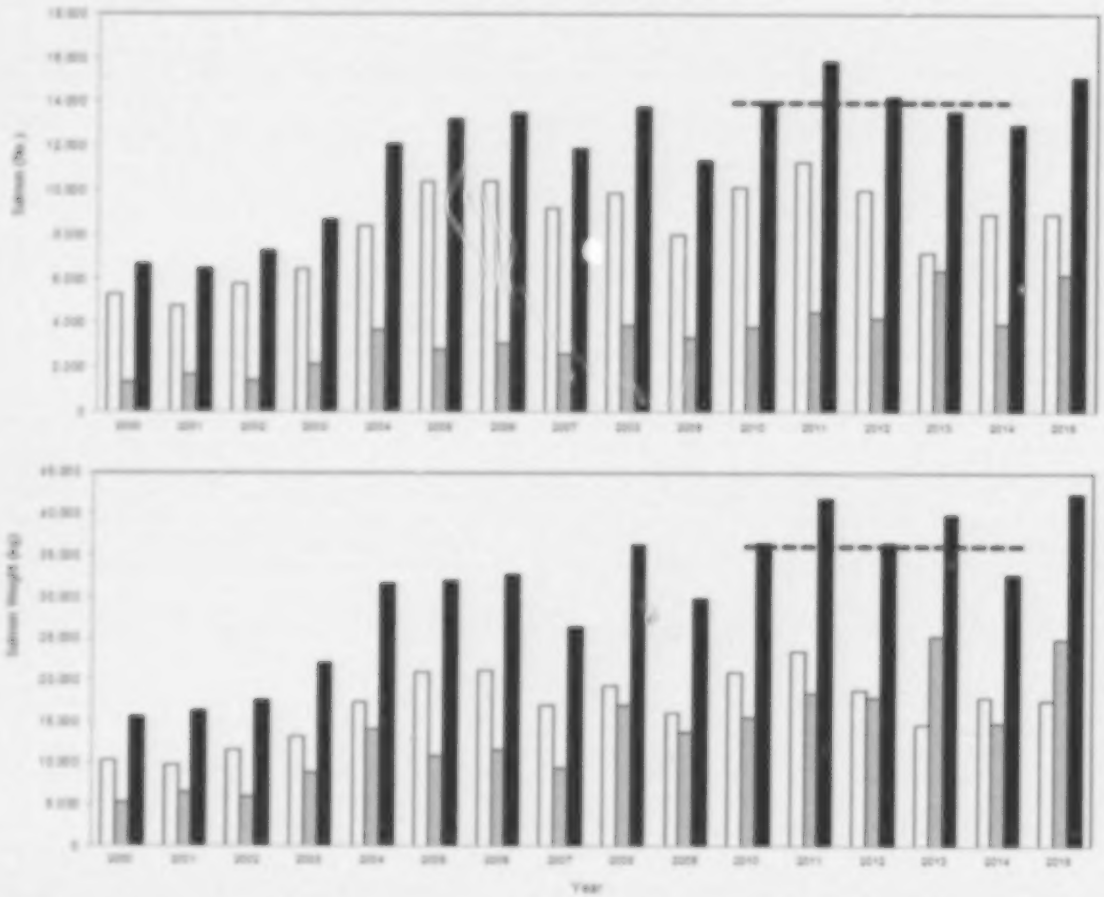

Figure 11. Harvest of small (white bars), large (grey bars) and total (black bars) Atlantic Salmon from Labrador subsistence fisheries (Aboriginal and Resident) 1999–2015 by number of salmon (upper panel) and weight of salmon (kg) (lower panel). Horizontal dashed black lines represent previous six-year means.

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